Automated Attendance Management System

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Abstract - *Almost everything that we do today is done using technology and is automated and linked online. The use of internet of things, machine learning libraries and image processing has been effectively used in almost all the fields. On top of that the covid-19 pandemic hit us hard this year and forced us to carry out learning in an online way, apart from that some universities and colleges consider to continue with far distance learning in the future even. We propose an automated online attendance management system that will be based on face recognition. This is achieved using machine learning algorithms and deep learning approaches after initiating pre-processing of images of the students and then training the model based on the face geometry. This integration would make it easier for the teachers and staff to manage classes in an automated way*.

Key Words: Online attendance, Machine Learning, Face Recognition, Deep learning, Eigen faces, SVM algorithm.

1. INTRODUCTION

Amidst the worldwide pandemic, a need to virtually carry out all the traditional processes was mandatory, In Fact all the schools, colleges and universities have adjusted to carry out teaching, posting, collecting assignments and even conducting exams through online platforms. In such a situation it becomes very crucial to carry out all the procedures in a traditional way as we used to do before the pandemic, so with the help of our idea we have tried to wave off some of the burden and make things ultimately simpler.

1.1 Implementation of Machine learning in facial recognition technology:

As a rapid transformation has been witnessed in the fields of AI, ML and deep learning technologies in the past few years, this industry is rapidly progressing towards various technologies and especially the growth factor in facial recognition technologies has been tremendously good. To get a proper gist of, what we can understand is that, this technique is basically capable of recognizing a person based on their different facial features. The technique of recognition of facial features serves 4 vital purposes viz. detection of all the faces, aligning them properly, performing feature extraction and finally recognizing them

- Firstly, to locate the face in the image or video is very crucial and until now most of the cameras already have those built-in functions of detecting the face accurately and this technology is something that today even most of the social media platforms also like Instagram, Snapchat, Facebook and many more allow their users to add on various effects to their pictures and videos.

- Now coming to proper alignment of faces then, what happens exactly is that faces are turned away from the main point of focus so in such cases a ML algorithm is trained in such a way that wherever facial landmarks or features are marked out, the desired results are obtained.

- Moving further, then in this particular step what will happen is it will cater into measuring and extracting various different features and this complete process is known as embedding, thereby allowing it to distinguish the face from others.

- Finally heading towards the last step, herein the unique parameters of each face are measured and with the help of a final machine learning algorithm the measurements of the face are taken against known faces present in a database.

2. LITERATURE REVIEW

In [1], researchers have made a complete web-based application by producing better efficiency by integrating various technologies. The authors have successfully managed to build an existing system which is currently used for managing attendance in Malaysia. But the efficiency could still be improved by using modern face recognition algorithms to create a more robust system for achieving better time complexity.

In [2], the authors have presented an automated attendance system that uses biometrics. A fixed camera will capture images and mark attendance which will be reflected in the database. Also the system sends automated messages to absent student's parents. But this requires installation of hardware.. For face recognition PCA algorithm is used but it can be further improved by using LBP algorithm since it makes the model more dynamic.

In [3], the author has proposed the method of face and head detection in real time and has improved the time to recognize and produce attendance records over 10 fps . This involves the FDF technology which is a very famous and robust method for real time face recognition as it involves linear discriminant analysis by taking four directional features of a face which could maintain a distinguished array for each detected face. This method is very close to what we are proposing as it does not involve contribution of any hardware component. Therefore the algorithm works uniquely firstly detecting skin color then morphology and lastly labels it using fastly connected-component labeling algorithm.

In [4] ,researchers have used a method of developing a comprehensive embedded class attendance system using facial recognition runs Raspbian (Linux) Operating System installed on a micro SD card. Primarily the algorithm in the proposed solution in Linear binary patterns. .The drawback of the same system is that it involves a hardware system of Raspberry Pi which itself cannot handle complex facial recognition algorithms and therefore they have executed with the local binary one which is not modern considering the time complexity for greater samples of images.

In [5], the researchers of this paper have used Principal Component Analysis abbreviated as PCA as an algorithm for face recognition. The proposed solution is fast ,stable and accurate and requires a computer with a camera only . Principal component analysis is an older technique but still considered efficient in the face recognition system for less sample images with less computational speed.

3. MACHINE LEARNING ALGORITHMS:

A good accuracy score creates an impact that the ML model is efficient enough to deliver the desired results. The accuracy of any ML model depends either on its input or on the data set used for training purposes.

 Here we've used 3 different machine learning algorithms to check our accuracy score which are as follows:

TRAINING MODEL	ACCURACY SCORE
Logistic Regression	0.925
Random Forest	0.984
SVM classifier	0.993

4. CONCLUSION:

After implementing various machine algorithms and by doing comparative analysis we can pitch that SVM classifier algorithm gives us the highest accuracy score depending on our dataset and it is also evident that Machine learning being the future of coming world will nurture us with its amazing and more efficient methods, solving the real world problems on a much larger scale.

5. RESULTS:

The following are the results of our functioning system:

Fig 5.1 Face recognition and labeled image for 4 students.

Fig 5.2 CSV file showing attendance
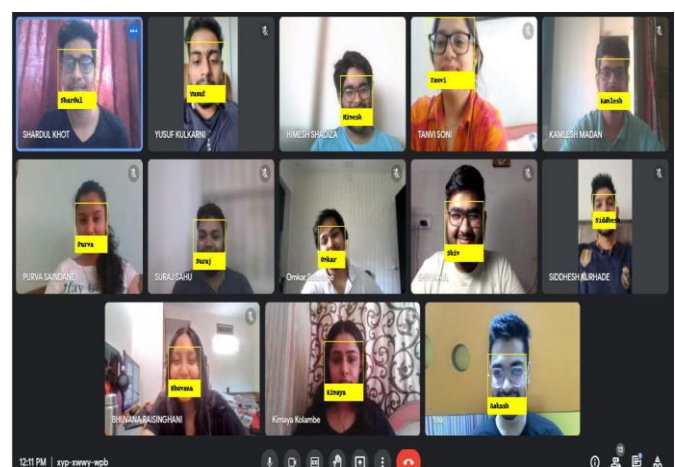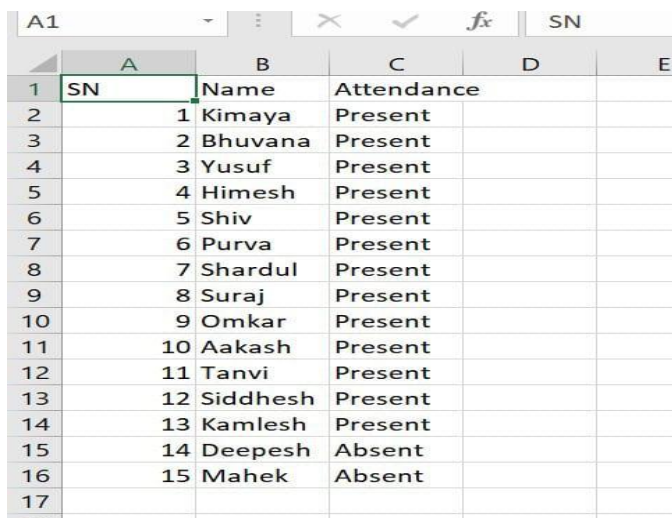
Fig 5.3 Face recognition and labeled image for 13 students

	A	B	C	D	E
1	SN	Name	Attendance		
2	1	Kimaya	Present		
3	2	Bhuvana	Present		
4	3	Yusuf	Present		
5	4	Himesh	Present		
6	5	Shiv	Present		
7	6	Purva	Present		
8	7	Shardul	Present		
9	8	Suraj	Present		
10	9	Omkar	Present		
11	10	Aakash	Present		
12	11	Tanvi	Present		
13	12	Siddhesh	Present		
14	13	Kamlesh	Present		
15	14	Deepesh	Absent		
16	15	Mahek	Absent		
17					

Fig 5.4 CSV file showing attendance

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